OIPE IAP6 AUG 22 2007 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	D. Stephen Lane, et al.	*Customer No.*	34444
Serial No.	10/533,994	*Art Unit:*	1751
Filing Date:	May 5, 2005	*Examiner:*	Brian P. Mruk

Title: Corrosion Protection for Metals in Cementitious Material and Method of Applying and Making the Same

AFFIDAVIT UNDER 37 CFR § 1.132

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, D. Stephen Lane, declare and state as follows.

1. I am Associate Principal Research Scientist at the Virginia Transportation Research Council, a partnership of the Virginia Department of Transportation and the University of Virginia.

2. I have a B.A. in Geology, Johns Hopkins University, Baltimore, Maryland, 1976; M.S. in Geology, Old Dominion University, Norfolk, Virginia, 1984.

3. A listing of my education, publications, projects, awards, and work history are provided in my Curriculum Vitae in the attached Appendix.

4. I am familiar with the prosecution of the above-identified Application.

5. In response to the pending rejections of the claims in this case as follows:

a. The rejection of claims 1-59 under 35 U.S.C. 102(b) as anticipated by or, in he alternative, under 35 U.S.C. 103(a) as obvious over Bennett, WO 01/40547;

b. The rejection of claims 1-59 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bennett, US. Patent No. 6,033,553;

c. The rejection of claims 1-59 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bennett, U.S. Patent No. 6,217,742;

d. The rejection of claims 1-59 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Stokes et al, U.S. Patent No. 6,022,408;

e. The rejection of claims 1-59 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Foltz et al, U.S. Patent No. 5,985,011,

I submit the following data:

6. The corrosion of steel reinforcement bars (rebar) embedded within concrete is a costly and limiting problem within the infrastructure. Corrosion of a metal is an electrochemical process, and an electrochemical reaction is distinctly different than a chemical process. In an electrochemical reaction, electrons are either a product or reactant in the reaction. In an oxidation reaction, electrons are a product. In a reduction process, electrons are a reactant. Corrosion requires both, an oxidation reaction and a reduction reaction to conserve charge. In the oxidation reaction, metal atoms become metal ions and electrons as the products of reaction ($M \rightarrow M^{n+} + ne^-$). These electrons are consumed by a reduction process, *e.g.*, the reduction of oxygen in the presence of water to produce hydroxyl ions. In both cases, electrons are either a product or reactant making the electrochemical reaction distinctly different than a chemical reaction. Chemical reactions do not predict electrochemical reactions, nor do electrochemical reactions predict chemical reactions.

7. Patents 5,985,011 (Stokes, Foltz, Manissero) and 6,022,408 (Foltz, Wang, Stokes, Manissero) use lithium nitrate (LN) as an agent to control the alkali silica reaction (ASR). ASR is a chemical reaction between silaceous rock (aggregate) and the alkaline environment created by cement. The chemical reaction between these two materials produces a gel-like reaction product on the surface of the aggregate that is of a higher volume than the original silaceous aggregate. This layer with expanded volume places the cement in tension and causes cracking of the concrete since concrete is weak in tension. LN is mixed into the cement paste to alter the physical properties of the gel reaction product, so that there is no volume change. The ASR is a chemical reaction between two ceramic phases and does not predict or teach us about the electrochemical reaction between the steel rebar and the cement.

8. Using LaChatlier's Principal, one can shift the direction and tendency of a reaction by changing the amount of reactants or products. Looking at the anodic reaction, $M \rightarrow M^{n+} + ne^-$, one can cause the reaction to proceed in reverse, thereby reversing corrosion, by supplying electrons to this reaction. In patents 6,033,553 and 6,217,742 (Bennett),

electrons are supplied by an external power source, e.g., a battery or power generator, to suppress corrosion. Therefore, corrosion is suppressed by the external power source which could be a battery beneath the bridge or a solar panel, etc. To increase the efficiency of power transmission within the very electrically resistive concrete, a salt, LN, is added to the cement paste. LN increases the conductivity of the concrete by increasing the number of charge carriers through dissociation into its cationic (Li^+) and anionic (NO_3^-) species. LN also increases the conductivity by increasing the humidity at the bar interface thus providing more electrolyte in this critical region. In both cases, the chemical caused by LN would predict that LN should increase corrosion. The additional claim for lithium salts in patent 6,217,742 is that it will minimize the deleterious effect of the anode reaction product (hydroxyl) on grout or mortar, in other words, alkali-silica reaction. The Bennett patents teach us that LN would increase the corrosion rate of steel rebar. In summary, the Bennett patents achieve corrosion suppression through the application of external power and do not teach us that LN is a corrosion inhibitor.

9. The patent application by Lane, Chambers, and Taylor shows that LN itself is a corrosion inhibitor of steel rebar when it is mixed into the concrete paste. This effect on an electrochemical reaction is not taught by the ASR patents which discussed a chemical reaction between two ceramic materials. In addition, the Bennett patents teach us that LN should increase the corrosion of steel rebar, when in reality the Lane, Chambers, Taylor patent teach us that LN inhibits corrosion of the steel rebar.

10. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements and the like so made punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code that such willful false statements may jeopardize the validity of the application of any patent issued thereon.

Date: August 10, 2007

D. Stephen Lane

RESUME
August 2007

Daniel Stephen Lane
Charlottesville, Virginia 22903

CURRENT
POSITION Associate Principal Research Scientist, Virginia Transportation Research Council

EDUCATION M.S., Geology, 1984, Old Dominion University, Norfolk, VA.
B.A., Geology, 1976, Johns Hopkins University, Baltimore, MD.

EXPERIENCE

1990 - Present
Research Scientist, VA Transportation Research Council. Conceives, designs, prepares budget, and conducts research on engineering properties and durability of concrete and aggregates for use in construction and maintenance of transportation structures and pavements. Transmits research findings and technical information through written reports, memoranda, and oral presentations before local, regional, and national audiences. Provides consulting services, performing petrographic examinations and overseeing engineering property testing of concrete and aggregates to assess their quality and performance for use in structures and pavement management, and manages petrographic laboratory. Peer reviews technical reports and articles. Member of national professional organizations including the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI) and the Transportation Research Board (TRB); serving actively on several subcommittees. Holds leadership roles in TRB (Member-at-large, Group F Executive Board); and ASTM Committee C01 Cement (Chair; Chair, Subcommittee C01.31 Volume Change) and Committee C09 Concrete and Aggregates (member-at-large, Executive Subcommittee; Chair, Subcommittee C09.26 Chemical Reactions).

1985 - 1990
Staff Engineer, National Aggregates Association and National Ready Mixed Concrete Association. Planned and oversaw laboratory research projects on concrete and concrete-making materials. Tabulated and analyzed of data using pc-based lotus and statistical software. Performed petrographic examinations of aggregates, concrete, and cement. Instructed short courses on aggregate and concrete testing and technology. Provided technical consulting and assistance. Reviewed and summarized technical literature for the development of research projects and technology transfer. Member of national concrete-related professional organizations (ASTM, ACI); active on several subcommittees.

1982 - 1983
Research Assistant, Old Dominion Research Foundation. Managed and executed statistical analyses of an extremely large paleontologic and stratigraphic database on mainframe computer.

1980 - 1981
Research Associate, Senior Inspector; Cement and Concrete Reference Laboratory, National Bureau of Standards. Inspected quality control laboratories in cement and concrete industry for conformance to applicable ASTM Standards. Edited technical reports of inspections. Trained of new personnel.

1977 - 1980
Research Associate, Inspector; CCRL, NBS. Inspected Q.C. labs. Interpreted specifications and test methods. Evaluated equipment, procedures and Q.C. systems for conformance to requirements of standards.

AWARDS

2007 American Society for Testing and Materials Award of Merit

PROFESSIONAL SOCIETIES & TECHNICAL COMMITTEES

American Society for Testing and Materials

Committee C09, Concrete and Aggregates
Subcommittees:
.90 Executive (member-at-large, Materials Group chair, 2002-)
.26 Chemical reactions (Chair, 2003-pres; secretary, 1994-2003)
.65 Petrography
.66 Resistance to fluid penetration
.93 Papers & Symposia (Joint w/ C01) (Chair, 1998-2004)
.95 Coordination

Committee C01, Cement (Chair, 2006-) (Secretary, 2000-2005)
Subcommittees:
.90 Executive (Chair) (Secretary, 2000-2005)
.10 Hydraulic Cements
.21 Air Content
.27 Strength
.28 Sulfate Content
.31 Volume Change (Chair, 2001-)
.32 Alkali (Chair, 1999-2005)
.93 Papers & Symposia (Joint w/ C09) (Chair, 1998-2004)
Organizing chairman or co-chairman of symposia on:
- Petrographic Techniques for Examining Hydraulic Cements and Concretes, (12/2004, and 6/2005)
- Concrete Durability: Deicing Chemicals and Freezing-Thawing (2003)
- Prescriptive and Performance Specifications for Hydraulic Cements: Issues and Implications for Standards Development (2000)
- Pozzolans and Slag: Essential for Concrete in the 21st Century (1999)
- Developments in Test Methods for Alkali-Silica Reaction (1998)

.92 Administrative Coordination
.95 Coordination of Standards
.99 Research

American Concrete Institute,
Committee 221, Aggregates

Transportation Research Board
Design and Construction Group Executive Board (2005-P)
Committee AFN30, Durability of Concrete (2002-P)
Committee AFP70, Mineral Aggregates (1995-P), Chair (1999-2005)
Committee AFN10 Basic Research and Emerging Technologies Related to Concrete (1993-2002)

NCHRP

Panel D4-11 (2001-2005) (Aggregate shape characterization) (Chairman)
Panel D18-11 (2001-P) (Processing additions in portland cement)
Panel D18-5 (1998-2001) (Relationship of portland cement characteristics to concrete durability) (Chairman)

AASHTO

Technical Implementation Group on Air Void Analyzer (2002-2003)
Lead State Team on Alkali-Silica Reactivity (1996-2001)

FHWA

MODOT Pooled-Fund Study on Advanced Research of an Image Analysis System for Hardened Concrete (2001-2006)
FHWA-ACI ASR Panel, Durability Workshops Project (1999-2001), Co-principal developer of workshop materials and instructor for *Concrete Durability: ASR and Other Deterioration Mechanisms*
Expert Task Group on Alkali-Silica Reactivity (1992-1996)

International Center for Aggregates Research (ICAR) Technical Activities Committee (2000-P)

VDOT Employee Suggestion Program/Ideas at Work review Committee (1991-2003)

Virginia Center for Innovative Technology Coal-Combustion By-Products Task Group (1990-1994)

Mid-Atlantic Technical Committee (1990-1994) (Concrete producer/User group)

PUBLICATIONS

Williamson, G.S., Weyers, R.E., Mokarem, D.W., Lane, D.S., and Reid, D.D., 2007. Vacuum Saturated Absorption as Aggregate Durability Indicator. *ACI Materials Journal*, V104, N0. 3, pp. 307-312.

Lane, D.S., 2006. An Evaluation of the Performance of Concretes Containing Fly and Ground Slag in Bridge Decks. VTRC 07-R7.

Lane, D.S., 2006. Laboratory Comparison of Several Tests for Evaluating the Transport Properties of Concrete. VTRC 06-R38.

Lane, D.S., 2006. Thermal Properties of Aggregates, in ASTM STP 169D, Significance of Tests and Properties of Concrete and Concrete-Making Materials, Lamond and Pielert, eds, American Society for Testing and Materials, pp. 425-431.

Lane, D.S., 2006. Laboratory Investigation of Air Void Systems Produced by Air-Entraining Admixtures in Fresh and Hardened Mortar. VTRC 06-R27.

Weyers, R.E., Williamson, G.S., Mokarem, D.W., Lane, D.S. and Cady, P.D., 2005. Testing methods to determine long term durability of Wisconsin aggregate resources. Wisconsin Highway Research Program, WHRP 06-07.

Mokarem, D.W., Weyers, R.E., and Lane, D.S., 2005. Development of a shrinkage performance specification and prediction model analysis for supplemental cementitious material concrete mixtures. *Cement and Concrete Research,* V35, pp. 918-925.

Lane, D.S., 2005. Supplanting the Rapid Chloride Permeability Test with a Quick Measurement of Concrete Conductivity. VTRC 05-R22.

Lane, D.S., and Stutzman, P.E., 2004. Petrographic Methods of Examining Hardened Concrete: A Comprehensive Manual (Revised Edition. VTRC 04-R21.

Lucas, J., Cousins, T.E., Brown, M.C., Sharp, S.R., and Lane, D.S., 2004. Structural Load Testing and Flexural Analysis of the Route 701 Bridge in Louisa County, Virginia. VTRC 04-R12.

Mokarem, D.W., Weyers, R.E., and Lane, D.S., 2003. Development of Performance Specifications for Shrinkage of Portland Cement Concrete, *Transportation Research Record No. 1834*, pp. 40-47.

Ozyildirim, C., and Lane, D.S., 2003. An Evaluation of Self-Consolidating Concrete. VTRC 04-R13.

Chambers, B.D., Taylor, S.R., and Lane, D.S., 2003. An Evaluation of New Inhibitors for Rebar Corrosion in Concrete. VTRC 03-R8.

Meyerson, R., Weyers, R.E., Mokarem, D.W., and Lane, D.S., 2002. Compressive Creep of Prestressed Concrete Mixtures with and without Mineral Admixtures. VTRC 03-CR5.

Lane, D.S., 2002. Final Report: Laboratory Investigation of Lithium Bearing Compounds for Use in Concrete. VTRC 02-R16.

Lane, S., 2001. Research Pays Off: Alkali-Silica Reaction, Preventing Damage in Hydraulic Cement Concrete, *TR News,* Nov-Dec, No. 217, pp. 29-30.

Lane, D.S., 2001. Assessing Alkali-Silica Reactivity of Aggregates from Field Performance, *Proceedings, 9th Annual Symposium*, International Center for Aggregates Research, Austin, Texas.

Lane, D.S., 2000. Preventive Measures for Alkali-Silica Reactions Used in Virginia, USA. *Proceedings, 11th International Conference on Alkali-Aggregate Reaction,* M-A. Berube, B. Fournier, and B. Durand, eds. CRIB, Quebec, Canada, pp. 693-702.

Lane, D.S., 2000. Alkali-Silica Reactivity in Virginia USA: Occurrences and Reactive Aggregates. *Proceedings, 11th International Conference on Alkali-Aggregate Reaction,* M-A. Berube, B. Fournier, and B. Durand eds. CRIB, Quebec, Canada, pp. 385-394.

Lane, D.S., and S. Forster, 2000. Mineral Aggregates. *Transportation in the New Millennium: State of the Art and Future Directions.* Transportation Research Board, Washington, D.C.

Lane, D. S., and H. C. Ozyildirim, 1999. Evaluation of the Effect of Portland Cement Alkali Content, Fly Ash, Ground Slag, and Silica Fume on Alkali-Silica Reactivity, *Cement, Concrete and Aggregates,* V21(2), pp. 126-140.

Lane, D. S., 1999. Comparison of Results from C 441 and C 1293 with Implications for Establishing Criteria for ASR-Resistant Concrete, *Cement, Concrete and Aggregates,* V21(2), pp. 149-156.

Lane, D.S., 1999. Virginia's Approach to Evaluation of Concrete Resistant to Alkali-Silica Reactions, *Transportation Research Record No. 1668*, pp. 42-47.

Lane, D.S., and Ozyildirim, H.C., 1999. Preventive measures for alkali-silica reactions (binary and ternary blends), *Cement and Concrete Research,* V29(8), pp. 1281-1288.

Lane and Ozyildirim, 1999. Final Report: Combinations of Pozzolans and Ground, Granulated, Blast-Furnace Slag for Durable Hydraulic Cement Concrete, VTRC 00-R1

Clemena, Lane, Lozev, and Freeman, 1999. Final Report: Evaluation of Methods for Application in Early Detection of Deterioration in concrete Pavements, VTRC 00-R13.

Lane, D. S., and Ozyildirim, H. C., 1999. Evaluation of the Potential for Internal Sulfate Attack Through Adaptation of ASTM C342 and the Duggan Test, *Cement, Concrete and Aggregates,* V21(1), pp. 43-57.

Lane, 1999. Identification and Use of Alkali-Silica Reactive Aggregates. 7th Annual Symposium Proceedings, International Center for Aggregates Research, Austin, Texas.

Lane, 1998. Final Report: Evaluation of Concrete Characteristics for Rigid Pavements. VTRC 98-R24.

Scott, Lane, and Weyers, 1997. Final Report: Preliminary Investigation of the Relationship Between Capillary Pore Pressure and Early Shrinkage Cracking of Concrete. VTRC 97-R12

Lane, 1996. Final Report: Use of the Rapid Immersion Test to Evaluate the Efficacy of Admixtures to Mitigate Alkali-Silica Reactivity. VTRC 96-R22.

Lozev, Lane, Clemena, and Nakhleh, 1996. Initial Laboratory Studies of the Nondestructive Evaluation of Concrete Consolidation using a Pulsed Ultrasonic Interferometer. VTRC 96-R18.

Ozyildirim and Lane, 1995. Final Report: Effects of Blends of Cement Kiln Dust and Fly Ash on Properties of Concrete. VTRC 96-R1.

Lane and Ozyildirim, 1995. Final Report: Use of Fly Ash, Slag, and Silica Fume to Inhibit Alkali-Silica Reactivity. VTRC 95-R21.

Lane, 1995 Specification Approaches: Preventing Alkali-Silica Reactivity. Proceedings of Aggregates symposium, Concrete, Bases, and Fines. Center for Aggregates Research.

Lane, 1994. Quality of Aggregates in Virginia, Proceedings. Pavement Symposium, Virginia Aggregates Association.

Lane, 1994. Thermal Properties of Aggregates, in ASTM STP 169C, Significance of Tests and Properties of Concrete and Concrete-Making Materials, Klieger and Lamond, eds, American Society for Testing and

Materials, pp. 438-445.

Lane, 1993. Final Report: Alkali-Silica Reactivity in Virginia, VTRC 94-R17.

Lane, 1993. Experience with ASTM P214 in Testing Virginia Aggregates for Alkali-Silica Reactivity, TRR No. 1418, Transportation Research Board, Washington, D.C., 1993, p. 8-11.

Lane, 1992. Alkali-Silica Reactivity: An Overview of a Concrete Durability Problem, in Materials Performance and Prevention of Deficiencies and Failures, Proceedings of the 1992 ASCE Materials Engineering Congress, T. D. White, ed., American Society of Civil Engineers, pp. 231-244.

Lane, 1991. Testing Fly Ash in Mortars for Air-Entrainment Characteristics. *Cement, Concrete and Aggregates,* V13(1), pp. 25-31.

Lane & Meininger, 1987. Laboratory Evaluation of the Freezing and Thawing Durability of Marine Limestone Coarse Aggregate in Concrete, in Concrete Durability, K. and B. Mather International Conference, J. M. Scanlon, ed., ACI SP-100, American Concrete Institute, pp.1311-1324.

Lane, 1986. Long-Term Mortar-Bar Expansion Tests for Potential Alkali-Aggregate Reactivity, in Concrete Alkali-Aggregate Reactions, Proceedings of the 7th International Conference, P. Grattan-Bellew, ed., Noyes Publications, pp. 336-341.

TALKS and PRESENTATIONS

June 2007. ASTM Symposium on Tests for Measuring Concrete's Resistance to Fluid Penetration and Their Use in Practice: Correlation of early conductivity measurement with C 1202 results

June 2007. ASTM Symposium on Tests for Measuring Concrete's Resistance to Fluid Penetration and Their Use in Practice: Transport property measurement of bridge deck concretes

May 2005. TRB Symposium at the Highway Geology Symposium: Chemical reactions of aggregates.

April 2005. International Center for Aggregates Research 13th Annual Symposium: Relating laboratory tests to field performance.

March 2005. SASHTO Quality Conference: Aggregate properties and field performance.

April 2004. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (South Dakota DOT).

March 2004. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (DC DPW).

March 2004. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Oklahoma DOT).

February 2004. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Wisconsin DOT).

January 2004. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Hawaii DOT).

December 2003. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Florida DOT).

December 2003. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Connecticut DOT).

November 2003. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Illinois DOT).

November 2003. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Missouri DOT).

October 2003. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Colorado DOT).

October 2003. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Utah DOT).

April 2003. International Cement Microscopy Association: Alkali-Carbonate Reactions.

November 2002. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Louisiana DOT).

May 2002. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Mississippi DOT).

March 2002. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Nevada DOT).

February 2002. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Kansas DOT).

December 2001. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (New Mexico DOT).

October 2001. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (CALTRANS, in Sacramento).

October 2001. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (CALTRANS, in Anaheim).

September 2001. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Rhode Island DOT).

July 2001. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Nebraska DOH).

June 2001. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (Vermont DOT).

April 2001. International Center for Aggregates Research 9th Annual Symposium, "Assessing Alkali-Silica Reactivity of Aggregates from Field Performance".

April 2001. FHWA-ACI Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms (for PennDoT at Pennsylvania State University)

December 2000. ASTM Committees C01 and C09 Symposium on Performance and Prescriptive Specifications for Hydraulic Cements and Their Use in Concrete.

(Co-Chairman and Organizer).

November 2000. ACI Convention: Historic Mortars of Thomas Jefferson.

September 2000. FHWA-ACI Pilot Workshop on Concrete Durability: ASR and Other Deterioration Mechanisms, Baltimore MD.

June 2000. 11th International Conference on Alkali-Aggregate Reaction in Concrete, Quebec City, Canada. 1) Alkali-Silica Reactivity in Virginia, USA: Occurrences and Reactive Aggregates; 2) Preventive Measures Used for Alkali-Silica Reactions in Virginia, USA.

December 1999. ASTM Committee C09 Symposium on Pozzolans and Slag (Essential component of Concrete in the 21st Century (Co-Chairman and Organizer)

April 1999. International Center for Aggregates Research 7th Symposium, "Identification and Use of Alkali-Silica Reactive Aggregates"

March 1999. ACI Convention, "Alkali-Silica Resistant Concretes Using Pozzolans and Slag"

January 1999. Virginia Precast/Prestressed Concrete Association, "Pozzolans and Slag for Durable Concrete".

January 1999. TRB Session 71, "Virginia Approach to Evaluation of ASR-Resistant Concrete".

December 1998. ASTM Symposium on Developments in Test Methods for Alkali-Silica Reaction, "Comparison of Results from ASTM C 441 and C 1293 with Implications for Establishing Criteria for ASR-Resistant Concrete". (Symposium Chairman)

October 1998. Mid-Atlantic Region SHRP Technology Exchange and Exhibition, "Virginia DOT Experience with ASR".

July 1998. Engineering Foundation, Advances in Cement and Concrete, Banff, Alberta, "Preventive Measures for ASR (Binary and Ternary Systems)"

June 1998. ASTM Meetings, Atlanta, GA, Subcommittees C09.24 and C09.26, Specification Limits for Slag to Resist Alkali-Silica Reactions"

June 1998. ASTM Meetings, Atlanta, GA, Subcommittee C01.31, "Evaluation of a C 1157 Performance Blended Cement"

April 1998. University of Illinois CE Dept, "Concrete Petrography"

April 1998. University of Illinois CE Dept, "Concrete Research for Transportation Systems"

December 1997. ASTM C01.32 Meeting, Comparison of C 441 and C 1293 Results Evaluating Fly Ash, Slag and Silica Fume for ASR Mitigation".

December 1997. ASTM Symposium on Internal Sulfate Attack on Cementitious Systems: Implications for Standards, "Evaluation of the Potential for Internal Sulfate Attack Through Adaptation of ASTM C 342 and the Duggan Test".

November 1997. FHWA Region I Meeting on ASR, "VDOT Specifications for ASR-resistant Concrete".

April 1997. ACI Convention, "Avoiding Field Failures".

December 1996. National Institute for Standards and Technology Construction Materials Group, "Concrete Durability in Transportation Structures and Pavements".

December 1996. ASTM Subcommittee C01.32, "The Effect of Cementitious Materials on Alkali-Silica Reactivity".

March 1995. Center for Aggregates Research Symposium on Aggregates, "Specification Approaches: Preventing Alkali-Silica Reactivity".

September 1994. FHWA-SHRP Pilot Showcase Workshop on Alkali-Silica Reactivity; VDOT Experience and Procedures for ASR."

March 1994. Virginia Aggregates Association, Virginia Asphalt Association, American Concrete Paving Association Pavement Symposium, "Aggregate Quality for Virginia Pavements".

March 1994. Roanoke Cement Company Concrete Technology Meeting, "Update on Alkali-Silica Reactivity".

February 1994. FHWA Region III QA Workshop, "VDOT's Experience with Silica Fume Concrete".

February 1994. FHWA Region III QA Workshop, Panel Discussion: "Bridge Deck Cracking".

January 1994. TRB Session 233 Organizer, Volume Change and Stability of Concrete.

November 1993. Pavement Materials Conference, Transportation Materials Research Center, N.C.S.U. Raleigh, N. C., Alkali-Silica Reactivity."

April 1993. Joint Meeting - NCDOT, VDOT, and Roanoke Cement Company, "Update on Virginia's Experience with Alkali-Silica Reactivity."

January 1993. TRB Session 3A, Performance Related Aggregate Testing. "Experience with ASTM P 214 in Testing Virginia Aggregates for Alkali-Silica Reactivity".

October 1992. Pittsburgh ACI Chapter, talk on alkali-silica reactivity.

August 1992, ASCE Materials Congress, Paper, "Alkali-Silica Reactivity: An Overview of a Concrete Durability Problem".

July 1992. CIT Combustion By-Products Task Force, talk on VDOT specifications and ash utilization.

March 1992. ACI Convention, Hot Topic Session, "Alkali-Silica Reactivity in Transportation Structures".

February 1992. FHWA Region III QA/QC Workshop, "Update on ASR -VDOT Perspective".

February 1991. Virginia Aggregates Association Technical Committee, talk on alkali-silica reactivity.

January 1991. TRB Committee A2H03 on Aggregates, talk on alkali-silica reactivity.

January 1991. TRB Committee A2E01 on Performance of Concrete, talk on testing fly ash for air entrainment characteristics.

September 1990. Virginia Ready Mixed Concrete Association, talk on alkali-silica reactivity.

September 1988. NRMCA Trouble Shooting Course, "Effect of Chloride Ions on Reinforcing Steel".

April 1987. ACI International Conference on Concrete Durability, presented paper.

August 1986. 7th International Conference on Alkali-Aggregate Reactions, presented paper.

1986-1990. NAA/NRMCA Short Courses on Concrete and Concrete Aggregates, talks on "ASTM C 94, Specification for Ready Mixed Concrete", "Testing Hardened Concrete", sieve analysis and various aggregate quality tests.